FY 2016 CHIEF OF NAVAL OPERATIONS
ENVIRONMENTAL AWARD COMPETITION
AWARD CATEGORY:
ENVIRONMENTAL RESTORATION, INSTALLATION

Mission

We provide 5-star quality service and support to the Fleet, the Fighter, and the Family. We are an extension of our Fleet's warfighting capabilities and are dedicated to sustaining the mission readiness and effectiveness of our tenant commands and organizations.

Vision

Naval Base Point Loma will build and sustain a reputation for excellence by adhering to the following core values:

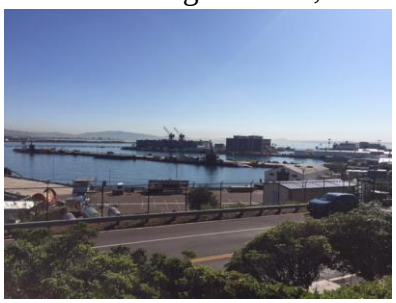
Do the Right Thing
Know our Profession
Be a Good Shipmate and Co-Worker
Approach Every Day with a 'Fix It Now' Mentality

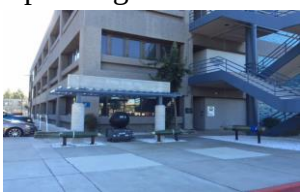
Naval Base Point Loma

Established on 01 October 1998, Naval Base Point Loma (NBPL) consists of three geographically separated areas in the Point Loma region of metropolitan San Diego. The NBPL Commanding Officer is responsible for seven installations/complexes and 41 special areas spread throughout San Diego County. NBPL is home to over 70 tenant commands, and provides base operating support for Commander THIRD Fleet, Space and Naval Warfare Systems Center Headquarters, Naval Mine and Anti-Submarine Warfare Command, Submarine Squadron ELEVEN and several others.

The seven separate installations/complexes with an approximate population of 22,400 Sailors and civilians include the NBPL Main Base; NBPL Harbor Drive Annex; NBPL Old Town Complex; Commander Third Fleet (C3F) Headquarters Complex; Space and Naval Warfare Systems (SSC) Bayside Complex; SSC Topside Complex; and SSC Seaside Complex. Together they form a highly technical hub of naval activity.

NBPL Main Base – Situated on the historically significant western entrance of San Diego Harbor, NBPL Main Base provides essential facilities to support the west coast's fast attack submarines. In addition, Main Base serves as a guardian of an abundance of cultural and natural resources. Tenant commands include Commander Submarine Squadron ELEVEN (CSS 11), Sea Logistics Command, Portsmouth Naval Shipyard Detachment San Diego, the Magnetic Silencing Facility (only one in the Pacific Region), and the Fleet Logistic Center (FLC). FLC is the primary source of fuel for ships and aircraft operating in the Southern California (SOCAL) Operating Areas.





NBPL Harbor Drive Annex (HDA) – HDA is situated in the eastern portion of Point Loma, San Diego, and is home to the warfare center of excellence for Anti-Submarine Warfare (ASW). HDA major tenant commands and facilities include the Naval Mine & Anti-Submarine Warfare Command (NMAWC), Explosive Ordnance Disposal Mobile Unit ONE, the Defense Acquisition University West Region, and the Admiral Kidd Catering and Conference Center.

NBPL Old Town Complex (OTC) – Located with San Diego's Old Town District, OTC is the headquarters of the Space and Naval Warfare Systems Center Pacific (SSC Pacific). SSC is the Navy's premier research, development, test, and evaluation (RDT&E) laboratory for command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR) systems.

Commander Third Fleet (C3F) Headquarters Complex – C3F is located on the top of the Point Loma peninsula and is the headquarters for the Commander, U.S. THIRD Fleet, which commands and provides training for naval forces in the Eastern Pacific from the West Coast of North America to the international date-line.

Space and Naval Warfare Systems (SSC) Bayside, Topside, and Seaside – These three complexes contain vital research, design, and evaluation facilities. The Topside Complex is the home of the Naval Health Research Center (NHRC), the designated Department of Defense (DOD) Deployment Health Research Center, which optimizes the operational health and readiness of our armed forces.

The Bayside and Seaside Complexes provide SSC the necessary facilities to complete life cycle development and support for C4ISR systems. While the Bayside Complex conducts research and development for the Navy's marine mammal program, SSC Seaside maintains unique facilities such as the Transducer Evaluation Center (pictured on the left), which is a controlled environment, low ambient noise, transducer calibration and underwater acoustic test facility.

Environmental Organization

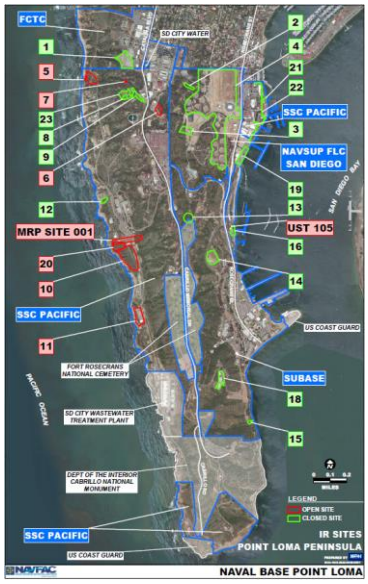
The NBPL Commanding Officer (CO) leadership is vital to the success of the environmental programs on NBPL. The CO provides guidance and oversight to ensure environmental integration with the military mission and management direction to the Public Works Officer (PWO) and the Installation Environmental Program Director (IEPD). The IEPD, who reports to the PWO and the CO, manages the NBPL Public Works Office's Environmental Division (EV) manned by experienced and capable staff of environmental professionals to manage all aspects of NBPL's environmental program. The EV's mission is to provide the NBPL CO and tenant commands with the environmental subject matter expertise necessary to ensure compliance with local, state, and Federal environmental requirements, while also maintaining consistency with the Navy's mission of national defense. The NBPL EV staff is committed to assist operating forces in conducting training in a manner compatible with the environment. We believe national defense and environmental protection are not mutually exclusive goals. Part of our mission is to prevent pollution, protect the environment, and protect natural, historical, and cultural resources.

NAVFACSW Installation Restoration Program provides program management support for the NBPL CO. The program goal is to provide for cost-effective and timely site assessment, planning, and remediation of identified releases consistent with Defense Environmental Restoration Program (DERP) requirements. Every 2 months the IEPD and the Installation Restoration (IR) program manager facilitate Restoration Advisory Board (RAB) meetings. The RAB is designed to provide Point Loma residents status and input on several ongoing remediation projects on NBPL. An annual RAB bus tour of NBPL remediation sites is made available to local residents.

NBPL Installation Sites

- OTC Site 1: Railroad Spur (Bldg. 8 Railroad Spur)
  - Contaminants of concern (COCs): PCBs in soil
- OTC Site 10: Bldg. 33 Liquid/Sludge
  - COCs: Chlorinated solvents (PCE, TCE, DCE) in groundwater
- OTC Site 11: Bldg. 3 Sewer Line Break
  - COCs: Chlorinated solvents (PCE, TCE, DCE) in groundwater
- OTC Site 100: Taylor Street Complex
  - COCs: None identified at this point

- SPAWAR Site 5: North Coast Rubble Disposal Area
  - COCs: Primarily metals in sewage sludge
- SPAWAR Site 6: Bldg. A-86 Rubble Disposal Area
  - COCs: None identified at this point
- SPAWAR Site 7: Bldg. A-44 Rubble Disposal Area
  - COCs: PCBs and lead in soil
- SPAWAR Site 8: Bldg. A-34 Rubble Disposal Area
  - COCs: PCBs and lead in soil
- SPAWAR Site 9: Bldg. A-34 Plating Waste Disposal Area (PWC B-34 Plating)
  - COCs: PCBs and lead in soil
- SPAWAR Site 10: Sewage Sludge Spreading Area
  - COCs: Primarily metals in sewage sludge
- SPAWAR Site 11: South Coast Rubble Disposal Area
  - COCs: None identified at this point
- SPAWAR Site 20: Old ICSTF Radar Complex Station (Central Coast Rubble Disposal
  Area)
  - COCs: Primarily metals in sewage sludge
- SPAWAR Site 23: Abrasive Blast Grit Disposal Area
  - COCs: PCBs and lead
- SPAWAR MRP Site 1: Small Arms Range
  - COC: Lead
- SUBASE Site 14: Ball Field (Old Refuse Disposal Area)
  - COCs: None identified
- SUBASE Site 15: Building 527 Weapons Storage (Submarine Base Rubble Disposal
  Area)
  - COCs: None identified
- SUBASE Site UST 105: Deperming Bldg. 2 UST
  - COC: Petroleum



Outstanding Achievements:

Awards: ** 2016 Excellence in Environmental Engineering and Science Award for Design/Build Remediation Systems for VOC-Contaminated Groundwater, Soil Gas and Indoor Air at NBPL.*

- OTC Site 1: Railroad Spur: Record of Decision (ROD) and Remedial Action completed with the excavation and disposal of PCB contaminated soil.
- OTC Sites 10 & 11: Soil Vapor Extraction (SVE)with Enhanced Anaerobic Bioremediation (EAB) and Vapor Intrusion:
  - Signed ROD January 2015
  - SVE with EAB installed June 2015 and continues to operate successfully reducing soil gas contamination levels from 880,000 micrograms per cubic meter ($\mu g/m^3$) to 7400 $\mu g/m^3$.
  - Phase II vapor intrusion field work (installation of sub slab ventilation system (SSVS)) completed in February 2016 which has reduced indoor air trichloroethylene (TCE) levels below EPA exposure limits.
- OTC Site 100: Extended Site Inspection completed "No Further Action" (NFA) determination with unrestricted use.
- SPAWAR Sites 5, 8, 9, 10, 20 and 23:
  - Completed NFA Record of Decision with Land Use Controls
  - Completed Land Use Controls Plan (LUCP)

- Completed baseline inspection completed in October 2016.

Old Town Complex Building 3 (OTC 3) Vapor Intrusion Remediation Project

Offices vacated as a result of vapor intrusion are now reoccupied due to successful SVE/EAB and VI mitigation

The highlight of the NBPL IR program during this reporting period was the successful reduction of TCE vapors within OTC 3 to below the EPA 8-hour exposure allowable limits resulting in the improved air quality within the building and reuse of several office spaces. The innovative remediation design was recognized by the prestigious American Academy of Environmental Engineers and Scientists (AAEES, www.aaees.org), who awarded Naval Base Point Loma the Grand Prize award in the Industrial Waste Practices category in the 2016 Excellence in Environmental Engineering and Science international competition. The project also received the W. Wesley Eckenfelder Industrial Waste Management Medal for Navy Region Southwest, which accompanied the award. "This effort has enabled the building tenant, Space and Naval Warfare Systems Command Pacific, to continue its mission in support of naval, joint, national, and coalition warfighters, "said Joseph Stuyvesant, Navy Region Southwest Executive Director.

The project was "Design-Build of Remediation Systems for Volatile Organic Compound (VOC)-Contaminated Groundwater, Soil Gas, and Indoor Air at Naval Base Point Loma, California." The remedial actions included a soil vapor extraction system for soil gas, enhanced anaerobic bioremediation systems for groundwater, and vapor intrusion mitigation measures for indoor air.

Background and Project Summary

Solvents stored at this former aircraft manufacturing facility likely contributed to volatile organic compound (VOC) contamination (primarily TCE) in groundwater, soil gas, and indoor air. With hundreds of workers in the facility and intense regulatory scrutiny, the Navy Commanding Officer insisted on an expedited remediation. Remedial actions included: 1) a soil vapor extraction (SVE) system for soil gas, 2) enhanced anaerobic bioremediation (EAB) system for groundwater, and 3) vapor intrusion (VI) mitigation measures for indoor air. Since the remediation systems began operating in April 2015:

- Groundwater VOC concentrations have been reduced in nearly all monitoring wells (up to two orders of magnitude).
- The SVE system has removed approximately 52 pounds of TCE in 6 months.
- TCE in indoor air is now below EPA accelerated response action level (ARAL) of 8 µg/m^3 in all affected rooms, enabling workers to re-occupy the area. Prior to system startup, indoor air concentrations of TCE ranged up to 66 µg/m^3; currently, the highest TCE is 5.9 µg/m^3.

Integrating Remediation Systems

The SVE/EAB was installed first to address plume stability, reduce contaminant mass, and eliminate the TCE source. The EAB included 11 injection wells and 8 direct push injections (DPIs) to add emulsified vegetable oil (EVO) and commercially available microbial cultures to anaerobically degrade chlorinated VOCs in the groundwater. SVE included four

vertical wells and one horizontal well; two of these wells were installed approximately 200 feet from the affected rooms. VI mitigation measures were integrated into the SVE/EAB to ensure acceptable indoor air quality.

Originality and Innovation

SVE System

- A horizontal well placed in a conveyance piping trench within the building footprint extended the radius of influence (ROI) of the SVE system beyond the plume boundary, which provided the additional advantage of reducing TCE concentrations in the indoor air.
- Optimizing extraction well screens and the applied vacuum is resulting in negligible extraction of water, which significantly reduces off-site disposal of VOC-contaminated wastewater by 90% (compared to previous pilot testing).

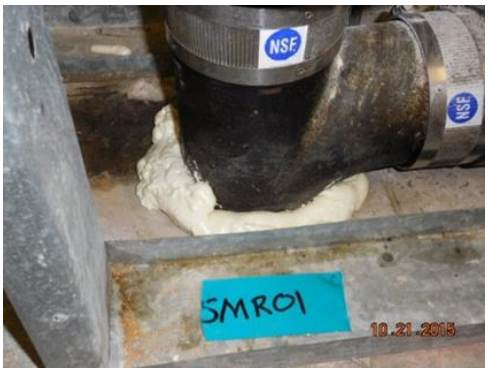
Concrete was removed to install conveyance piping and horizontal SVE well.

EAB System

- Optimized the remedial design for high-density utility area, including installing an additional six injection wells, and reducing the direct push injections (DPIs) from 89 to 8, providing more flexibility.
- Located injection wells near the source area and leading edge so that future injections will not require remobilizing a drill rig; location also supports creation of a recirculation zone, if remediation does not decrease VOCs to acceptable levels within a reasonable timeframe.

VI Mitigation

- An innovative mix of two VI mitigation measures provided extra protection: 1) a sub-floor ventilation system to remove VOC vapors, and 2) sealing of VI entry locations to eliminate migration of remaining vapors.
- Used remote control rover and video camera below the floor and along sub-floor piping to investigate preferential pathways for contaminated soil gas; this approach helped refine the conceptual site model and support design of the sub-floor ventilation system.
- Used helium tracer test as additional line of evidence to support design ROI of the sub-floor ventilation system.
- Designed the ventilation system to fit inside a closet to minimize visual impact and noise; a variable frequency drive control on the ventilation blower further reduced noise levels.
- Used HAPSITE® portable gas chromatography/mass spectroscopy (GC/MS) as a real-time method to identify vapor entry points.



Floor cracks were cleaned with v-notch grinding tool, and then sealed with low viscosity epoxy.

Complexity

SVE design/install: SVE design was based on a previous pilot test, which had generated significant water, due to relatively shallow groundwater (10 feet below ground surface) and high vacuum (100 inches water column [IWC]). A pilot well also showed an increase in VOCs. Finally, investigations after the pilot test indicated VI issues remained inside the building. These issues were addressed in the

design as follows:

- Operating vacuums were set lower than in the pilot test (less than 50 IWC), while still exerting adequate vacuum response to minimize water extraction (no water extraction has been visible during operation to date).
- Extraction focused on the area with increased VOCs (this has been successful, based on removal rates).
- A horizontal slotted pipe was installed in the conveyance trench for one of the vertical SVE wells, resulting in an inexpensive, horizontal well (strategically located). This resulted in a 90% reduction in indoor air VOCs within 3 months of SVE operations.

EAB design/install: Previous EAB pilot testing involved injection of emulsified vegetable oil (EVO) and biocultures using DPI, resulting in a conceptual design with 89 DPIs and 5 injection wells. Historical groundwater data indicated that groundwater had naturally high levels of total organic carbon (TOC). The design team hypothesized that these levels would allow the microbial cultures injected in 2012 to survive for several years, provided VOCs were also present. Also, many of the DPIs were to be located in areas with multiple buried utilities, posing implementation challenges. The pilot testing indicated limited mounding and almost no pressure during injections with DPIs, which indicated that the formation would be capable of receiving injectate. The design team accounted for these factors as follows:

- Decreased the design from 89 DPIs to 6 injection wells at the leading edge and 8 DPIs in the interior (the hypothesis of surviving bioculture was 100% accurate as verified during baseline testing), thereby avoiding a number of utilities.
- Decreased the bioculture volumes to be injected.

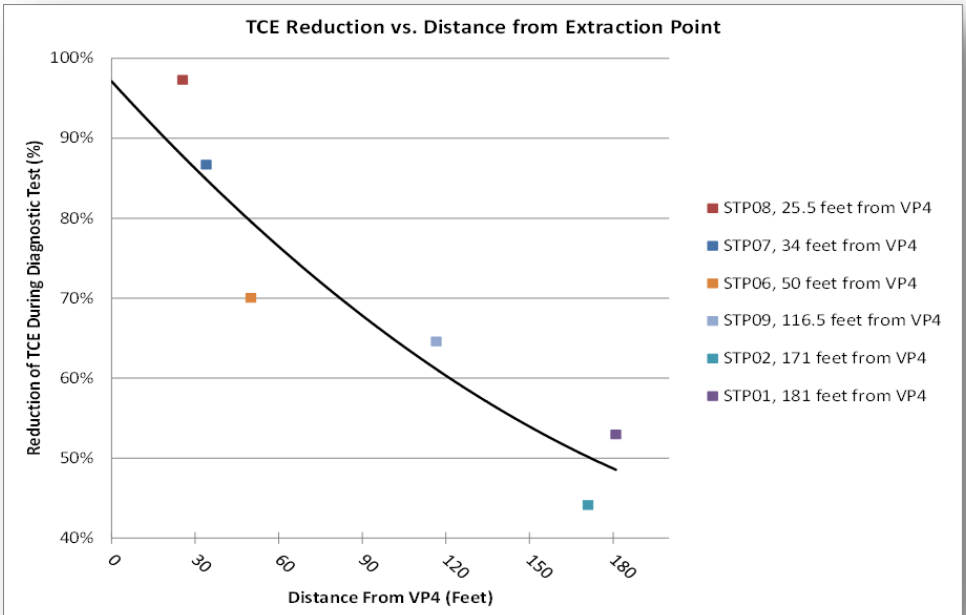
Room depressurization testing, using a blower installed into the office door frame and a HAPSITE portable GC/MS led to the discovery of the primary VI entry point.

VI Mitigation Measures: The sub-floor preferential pathways and VI entry points were hidden within the wall, so the following steps were taken:

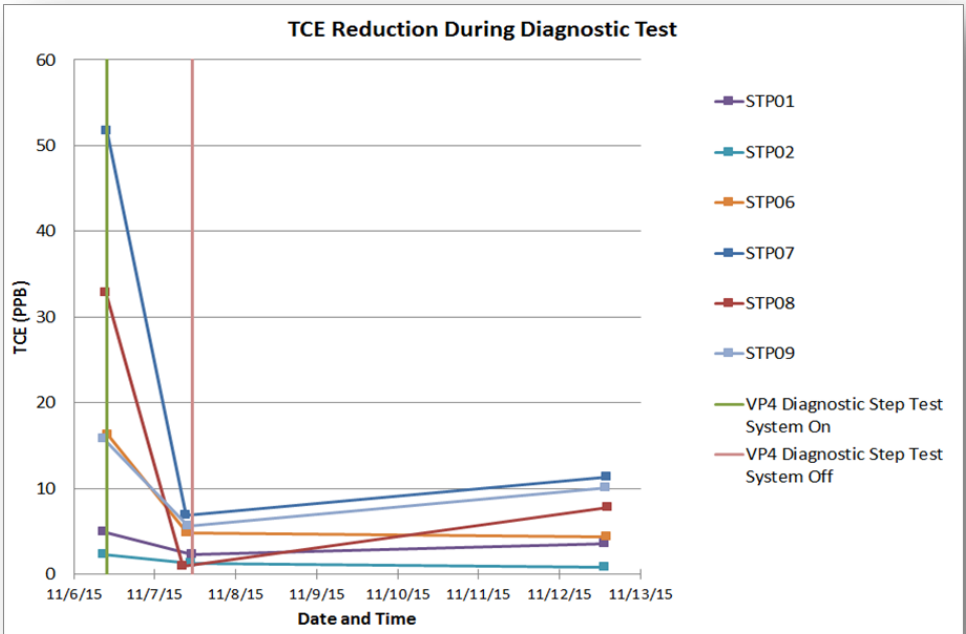
- A depressurization test with multiple extraction locations was used to identify the primary VI entry point and to determine that vapors were migrating.
- To avoid damaging drywall, piping locations were traced to determine likely floor penetrations.

Sustainable Results

The investment of time and resources has produced a significant increase in air quality. As a result the air within the affected offices has been restored to levels equivalent to outdoor air values and the offices have been reoccupied. Additionally the operation of the remediation systems will result in restoration of the shallow aquifer for future beneficial use.



A reduction in sub-floor TCE concentrations was observed over 180 feet from the extraction well during diagnostic testing.



A reduction in TCE concentrations to below the EPA ARAL was observed at all sub-floor test probe locations during diagnostic testing.